

Notice of Allowability

Application No.

09/866,035

Examiner

Mark Ruthkosky

Applicant(s)

YAMAGUCHI ET AL.

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7/15/2005.
2. ☒ The allowed claim(s) is/are 1-6,8-12,14-22 and 24-27.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

MARK RUTHKOSKY
PRIMARY EXAMINER

Mark Ruthkosky 9/22/05

DETAILED ACTION

Claim Rejections - 35 USC § 102

The rejection of claims 1-5, 8 and 25 under 35 U.S.C. 102(b) as being anticipated by Komaru et al. (JP 10-308,236) has been overcome by the applicant's amendment.

Claim Rejections - 35 USC § 103

The rejection of claims 6, 9-12, 14-22, 24 and 26-27 under 35 U.S.C. 103(a) as being unpatentable over Mayer (US 5,783,333) in view of Komaru et al., (JP 10-308236) has been overcome by the applicant's amendment.

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee. The title of the invention was not descriptive to the invention as amended. The new title is clearly indicative of the invention to which the claims are directed.

The application has been amended as follows: Change the title to "A nonaqueous electrolyte secondary battery including vinylene carbonate and an antioxidant in the electrolyte.

Allowable Subject Matter

Claims 1-6, 8-12, 14-22, and 24-27 are allowed.

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The following is an examiner's statement of reasons for allowance:

The instant claims are to a nonaqueous electrolyte secondary battery comprises a cathode having a cathode active material capable of being electrochemically doped/dedoped with lithium; an anode having an anode active material capable of being electrochemically doped/dedoped with lithium and a nonaqueous electrolyte interposed between the cathode and the anode, wherein said cathode active material is a lithium composite oxide expressed by a general formula where M indicates at least one or more elements selected from between Fe, Co, Mn, Cu, Zn, Al, Sn, B, Ga, Cr, V, Ti, Mg, Ca and Sr, and said nonaqueous electrolyte includes a vinylene carbonate and an antioxidant of at least one kind of material selected from quinines, aromatic amines, vitamin E, vitamin C, sesamoles and quercetins.

The prior art does not teach a secondary battery comprising a cathode having a cathode active material of a lithium composite oxide expressed by a general formula and M indicates at least one or more elements selected from between Fe, Co, Mn, Cu, Zn, Al, Sn, B, Ga, Cr, V, Ti, Mg, Ca and Sr, an anode having an anode active material capable of being electrochemically doped/dedoped with lithium and a nonaqueous electrolyte interposed between the cathode and the anode that includes a vinylene carbonate and an antioxidant of at least one kind of material selected from quinines, aromatic amines, vitamin E, vitamin C, sesamoles and quercetins.

The most pertinent prior art has been disclosed. For example, Komaru et al. discloses lithium secondary batteries that include a LiCoO_2 cathode active material and a carbon anode active material. The electrode includes a non-aqueous solvent and vinylene carbonate is disclosed as a solvent additive in an amount less than 20 wt. Phenol, an antioxidant, is disclosed as an electrolyte solvent component. The solvent further includes methoxybenzene compounds,

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such as fluoro-anisoles, in a concentration of preferably 0.005-9.8. The reference does not teach at least one kind of material selected from quinines, aromatic amines, vitamin E, vitamin C, sesamoles and quercetins with the vinylene carbonate additive in the non-aqueous electrolyte.

Mayer (US 5,783,333) discloses lithium secondary batteries comprising composite positive electrodes of lithium nickel cobalt metal oxides together with lithium manganese metal oxide of the formula $\text{Li}_x\text{Mn}_{2-r}\text{M}'_r\text{O}_4$, where r is a value between 0 and 1 and M' is chromium, titanium, tungsten, nickel, cobalt, iron, tin, zinc, zirconium, silicon, or a combination thereof, an intercalation negative electrode capable of reversibly taking up lithium on charge and releasing lithium on discharge, and an electrolyte conductive to lithium ions. The electrolyte preferably includes a mixture of ethylene carbonate, diethyl carbonate and diethyl carbonate with a dissolved lithium-containing salt, and may also include of polymer or gelling agent. The disclosure of Mayer differs from applicants' invention in that Mayer does not specifically disclose the addition of vinylene carbonate and the claimed antioxidants in the electrolyte.

The vinyl carbonate additive and the nonaqueous solvents used for the nonaqueous electrolyte are extremely apt to be decomposed by oxygen radicals generated in the battery under an environment of high temperature (instant specification, page 14, 3rd paragraph.) The antioxidant is added to the solution to suppress the decomposition of vinylene carbonate so to as improve the cyclic characteristics of the battery at higher temperature. As the prior art does not teach a secondary battery comprising a cathode active material of a lithium composite oxide, an anode having an anode active material capable of being electrochemically doped/dedoped with lithium and a nonaqueous electrolyte that further includes vinylene carbonate additive and an

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antioxidant of at least one kind of material selected from quinines, aromatic amines, vitamin E, vitamin C, sesamoles and quercetins, the claims are allowed over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky
Primary Patent Examiner
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Mark Ruthkosky
9/22/05